

EFFECT OF ENZYME SUPPLEMENTATION ON FEED INTAKE, GROWTH RATE AND EFFICIENCY OF FEED CONVERSION IN BROILER BIRDS FED SINGLE PHASE AD-LIBITUM

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ABSTRACT

An eight-week trial was conducted to study the effect of enzyme supplementation on feed intake, growth rate and efficiency of feed conversion in diets of broiler birds fed single phase ad-libitum. One hundred and forty four day old broiler chicks were randomly allotted to four different treatment groups with three replicates per treatment. Four (4) rations were formulated at different enzyme inclusion rate of the recommended levels of 0%, 50%, (1.2g), 75% (1.88g) and 100% (2.5g) and were tagged T₁, T₂, T₃ and T₄ respectively.

The chicks were fed the diets for a period of eight weeks. Data on body weight gain, feed intake and efficiency of feed conversion were taken. Data collected were analysed using analysis of variance (ANOVA) while means were separated using Duncan multiple range test. The result showed that birds on enzyme supplemented diets had better weight gain than those on the control diet (T₁). This difference was significant (P<0.05). Birds on 50 percent, 75 percent and 100 percent enzyme supplementation had 5 percent, 5.10 percent and 8.77 percent weight gain more than those on the control diet respectively. Feed intake was highest for birds on 50 percent enzyme supplementation with 13.54 percent over birds on the control diet and this was significant (P<0.05). Data on efficiency of feed conversion showed that birds on 50 percent enzyme supplementation recorded the best value of 1.62 compared to birds on the control diet with a value of 1.50 and these were also significantly different (P<0.05). Corn based diets supplemented with enzymes can be used in poultry to improve their performance.

KEY WORDS

Enzyme supplementation, feed, growth parameters, broiler birds, single phase ad-libitum.

INTRODUCTION

Advances in the field of enzyme technology have brought benefits to the pig and poultry industries for almost 10 years. By adding enzymes to feed, the majority of problems traditionally associated with cereal-based rations can be alleviated. Use of enzymes to target feeds such as corn or sorghum and containing soy bean meal is a more recent concept. In corn and sorghum, as with the grain-based diets, xylase enzymes are effective in degrading the fibrous cell walls of feed grains, releasing nutrients previously inaccessible to the animal. Furthermore, recent studies have revealed that in a normal bird, starch digestion may not be completed (Acamovic, 2001 and Chesson, 2001).

Just like xylanase, proteases also contribute to the digestive process. The subtilism protease is highly active and can degrade soy protein, namely the storage proteins, and the soybean anti- nutritional factor such as trypsin inhibitors, lectins and antigenic proteins.

Although the application of feed enzymes to improve the nutritive value of sorghum and corn soy bean meal diets is still in the developmental stage, such enzymes that can improve the performance of diets

based on corn and soy bean meal can offer broiler producers cheaper alternative, without compromising on bird performance. Cost saving can be made by practical application of enzymes to feed formulations. The two different methods of enzyme supplementation include:- (1) the simple over the top addition to an existing formulation to improve the broiler performance cost efficiency. (2) the second option is to change the feed formulation to reduce the cost of feed. Although this would normally lead to a reduction in performance, the addition of enzymes improves the value of the feed, resulting in a similar performance to the normal, more expensive, feed formulation.

Depending on normal feedstuff prices, this can give a net saving of approximately ₦360 - ₦600 (\$3 – 5) per ton of feed. Developments in feed enzyme technology may be the key to maintaining future profitability. It is against this background that this work was designed to evaluate the effect of enzyme supplementation on feed intake, growth rate, and efficiency of feed conversion in broiler birds fed single phase ad-libitum.

MATERIALS AND METHODS

Location of experiment and source of enzyme

The experiment was carried out at the Teaching and Research farm of the School of Agriculture and Agricultural technology, Federal University of Technology, Minna, Niger State, between the months of June and October 2006. The enzyme (Nutraser xyla) was obtained from the Department of Animal Science of the University of Ilorin, Ilorin.

Experimental Diet.

Prior to the arrival of the birds, four experimental diets which were isonitrogenous and iso-caloric (20% CP and 2800 Kcal/kg ME) and designated T₁ to T₄ were compounded. They contained enzyme at inclusion levels of 0% (o.g), 50% (1.2g), 75% (1.88g) and 100% (2.5g) of the recommended value respectively. Feed compounding was carried out in Feed Mill unit of the University Teaching and Research farm. Feeds compounded were fed single phase ad-libitum to the birds.

Experimental birds and their Management

At the arrival of the birds they were randomly distributed into four treatment groups each comprising of three replicates. The replicates contained 12 birds each which were weighed on arrival and subsequently weekly weights were recorded. Drinking water and feed were provided ad-libitum. Also the temperature of the brooding house was maintained at optimum level. Adequate medication was provided for the birds while feed intake, body weight were determined weekly accordingly.

The efficiency of feed conversion was also calculated. Samples of the diets were collected from each treatment group for proximate analysis.

The experiment was subjected to completely randomized design while data collected were subjected to analysis of variance (ANOVA). Means were separated using Duncan multiple range test (Duncan 1955).

Table 1 Composition of experimental diets supplemented with varying levels of enzyme (%) fed single phase to broiler birds.

Treatment diets (%)							
		T ₁		T ₂		T ₃	
Ingredients							
Maize		55.43		55.43		55.43	
Groundnut cake		21.57		21.57		21.57	
Fish meal		7.00		7.00		7.00	
Rice husk		9.00		9.00		9.00	
Lime stone		4.00		4.00		4.00	
Bone meal		2.00		2.00		2.00	
Methionine	0.25	0.25		0.25		0.25	
Lysine		0.25		0.25		0.25	
Vitamin/min		0.25		0.25		0.25	
Premix		0.25		0.25		0.25	
Salt	0.25	0.25		0.25		0.25	
Total		100.00		100.00		100.00	

T₁ = control diet with 0% enzyme inclusion levelT₂ = diet with 5% (1.20g) enzyme inclusion levelT₃ = diet with 75% (1.88g) enzyme inclusion levelT₄ = diet with 100% (2.50g) enzyme inclusion levelCalculated T₁ – T₄

Energy level = 2798.76 Kcal/kg ME

Protein level = 20.15%

Formulated T₁ – T₄

Energy level = 2800 Kcal/kg

Protein level = 20.00%.

Table 2 proximate composition of experimental diets supplemented with varying levels of enzyme (%) fed single phase to broiler birds

Treatment diets (%)							
		T ₁		T ₂		T ₃	
Nutrients (%)							
Dry matter		94.97		95.27		95.23	
Crude protein		20.40		20.02		20.24	
Ash		4.51		4.63		4.57	
Crude fibre		6.50		5.66		5.72	
Ether extract		4.98		4.88		4.87	
Nitrogen free extract		58.58		59.90		59.83	
Metabolizable energy							
Kcal/kg ME		2830		2840		2840	

T₁ – T₄ = same diets as in Table.

Table 3 Growth performance of broiler chicks fed single phase on diets supplemented with varying levels of enzyme (%).

Parameters	Treatment diets (%)				SEM
	T ₁	T ₂	T ₃	T ₄	
Initial body weight/ bird (g)	49.68 ^d	47.99 ^c	46.83 ^a	46.97 ^b	0.29
Final body weight/ bird (g)	1130.33 ^a	1182.73 ^b	1215.00 ^c	1222.40 ^d	9.37
Final body weight over and above T ₁	0%	4.64%	7.49%	8.15%	
Weight gain per bird (g)	1080.65 ^a	1134.74 ^b	1168.17 ^c	1175.43 ^d	9.66
Weight gain over and above T ₁	0%	5.00%	8.10%	8.77%	
Feed intake per bird (g)	1618.77 ^a	1837.92 ^d	1794.43 ^b	1803.28 ^c	21.99
Feed intake over and above T ₁	0%	13.54%	10.85%	11.40%	
Efficiency of feed conversion	1.50 ^a	1.62 ^d	1.54 ^c	1.53 ^b	0.01
Efficiency of feed Conversion over and above T ₁	0%	8.00%	2.67%	2.00%	

T₁ – T₄ = same as diets as in Table 1

abcd = means not having the same super script along the row are statistically significant (P<0.05).

RESULTS AND DISCUSSION

Table 1 shows the composition of the experiment diets supplemented with varying levels of enzyme. The diets were isonitrogenous and isocaloric. Table 2 on the other hand shows the proximate analysis of the four experimental diets. The analysis shows that the diets were similar in nutrient values in all respects. Table 3 shows the growth performance of the broiler chicks fed the experimental diets. Birds on enzyme supplemented diets had better weight gain than those on the control diet (T₁). This difference was significant (P<0.05). Birds on 50 percent, 75 percent and 100 percent enzyme supplementation had 5 percent, 8.10 percent and 8.77 percent weight gain more than those on the control diet respectively.

Feed intake was highest for birds on 50 percent enzyme supplementation with 13.54 percent over birds on the control diet this was followed by birds on 100 percent enzyme supplementation with 11.40 percent over the birds on the control diet. The least value of feed intake by birds was recorded by birds with 75 percent enzyme supplementation. This differences were also significant (P<0.05).

The efficiency of feed conversion shows that birds on 50 percent enzyme supplementation recorded the best value of 1.62 compared to birds on the control diet with a value of 1.50. This was followed closely by birds on 75 percent enzyme supplementation with a value of 1.54 while birds on 100 percent enzyme supplementation recorded a value of 1.53. These values were also significant (P<0.05).

The result for weight gain is in agreement with the works of Marquard *et al* (1994), who reported that enzyme supplementation of cereal based diets significantly improved chicks performance by increasing the rate of gain. The result is also in agreement with that of Al-Bustany (1996) who reported that enzyme supplementation of mash diets also tended to have more pronounced effect on

weight gain than supplementation of pelleted diets. Al-Bustany (1996) further stated that enzyme supplementation significantly increased live weight of chicks by 7.8 percent. This could be observed in 75 percent and 100 percent enzyme supplemented diets with values of 7.49 percent and 8.15 percent over birds on the control diet respectively.

The result of feed intake is in consonance with that of the National Research Council (1994) that studied the effects of a local sunflower meal diet containing 19.75 percent crude fibre supplemented with enzyme, on growth performance and feed intake of broilers, raised to market age (42 days) on floor pen. The observation was that high fibre content can be successfully included in the diet of broilers fed in mash form up to market age to give increase in growth rate and feed intake. This study revealed that birds on enzyme supplemented diets had above 10 percent feed intake over those on the control diet.

The result of efficiency of feed conversion in this experiment agrees with the findings of Marquard (1994), who reported that enzyme supplementation improved the feed conversion ratio and feed to gain ratio of birds. Patrick and Schaible (1980) also reported that the beneficial effects of enzyme treatment include, improvement in growth, feed utilization and litter conditions of chicks.

CONCLUSION

This experiment shows that corn based diets supplemented with enzyme improved feed intake, body weight gain and efficiency of feed conversion over and above those chicks whose diets were not supplemented. This implies that enzyme can be used in poultry diets at various recommended inclusion level to improve the performance of the birds.

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